CLAIMS:

What is claimed is:

1. A method comprising:

providing a layer having a crystalline structure including silicon atoms and geranium atoms over an insulating layer;

performing a vacancy injecting process, the vacancy injecting process injecting germanium atoms and vacancies into the crystalline structure.

2. The method of claim 1, wherein the vacancy injecting process includes forming a silicon nitride layer on the layer.

3. The method of claim 1, wherein the vacancy injecting process includes performing a nitridation process.

4. The method of claim 3, wherein performing the nitridation process comprises flowing ammonia over the layer, which forms a silicon nitride layer over the layer having a crystalline structure.

5. The method of claim 4, further comprising removing the silicon nitride layer, the method further comprises growing silicon oxide on the silicon germanium layer after removing the silicon nitride layer.

6. The method of claim 1, further comprising growing silicon oxide on the layer.

7. The method of claim 6 wherein the vacancy injecting process further comprises performing an inert gas post bake process after the growing the silicon oxide.

8. The method of claim 7 wherein the inert gas post bake process includes flowing hydrogen over the silicon oxide.

9. The method of claim 6, further comprising removing at least a portion of the silicon oxide.

10. The method of claim 9, wherein the vacancy injecting process is performed after the removing at least a portion of the silicon oxide.

11. The method of claim 1 wherein the vacancy injecting process comprises:
implanting nitrogen into the layer; and
growing an oxynitride layer on the layer.

12. The method of claim 11, wherein growing the oxynitride layer, comprises flowing oxygen over the layer after implanting nitrogen into the layer.

13. The method of claim 1, further comprising epitaxially growing strained silicon on the layer after injecting germanium and injecting vacancies to form a strained silicon layer.

14. The method of claim 1, wherein the vacancy injecting process comprises:
forming a metal layer that is reactive with silicon atoms on the layer; and
heating the metal layer to cause the metal layer to react with silicon atoms in the layer.

15. The method of claim 1 wherein the vacancy injecting process comprises:
flowing oxygen and a chloride bearing gas over the layer.

16. The method of claim 15 wherein the chloride bearing gas includes at least one of hydrogen chloride, chlorine, carbon tetrachloride, and trichloroethane.

17. The method of claim 15 wherein the chloride bearing gas is flowed at a temperature of approximately 1100 C or less.

18. The method of claim 1 wherein the vacancy injecting process includes performing an oxidation process with a chloride bearing gas.

19. The method of claim 1 wherein the vacancy injecting process includes an oxynitridation process.

20. The method of claim 19 wherein the vacancy injecting process includes flowing at least one of ammonia and oxygen, nitric oxide, and nitrous oxide over the layer.

21. A method comprising:

providing an insulating layer and a semiconductor layer of template layer material having a crystalline structure over the insulating layer, wherein the crystalline structure comprises atoms of a first type;

performing a vacancy injecting process to inject vacancies into the crystalline structure, wherein the vacancies recombine with atoms including atoms of a second type.

22. The method of claim 21, further comprising:

growing an oxide layer on the crystalline structure;

wherein the vacancy injecting process includes performing an inert gas post bake process after the growing.

23. The method of claim 22 wherein the inert gas post bake process includes flowing hydrogen gas over the oxide.

24. The method of claim 21, wherein the crystalline structure further comprises atoms of the second type prior to performing the vacancy injecting process.

25. The method of claim 21, wherein the first type is silicon and the second type is germanium.

26. The method of claim 25, further comprising epitaxially growing silicon on the crystalline structure after the performing to form a strained silicon layer.

27. The method of claim 21, wherein the vacancy injecting process includes flowing ammonia over the crystalline structure at an elevated temperature which grows a nitride layer on the crystalline structure.

28. The method of claim 27, further comprising removing the nitride layer.

29. The method of claim 21, further comprising epitaxially growing a layer including atoms of the first type over the crystalline structure after the performing the vacancy injecting process to form a strained semiconductor layer.

30. The method of claim 21, wherein the vacancy injecting process includes a nitridation process.

31. The method of claim 21 wherein the vacancy injecting process includes a silicidation process.

32. The method of claim 21 wherein the vacancy injecting process includes an oxynitridation process.

33. The method of claim 32 wherein the vacancy injecting process includes flowing at least one of ammonia and oxygen, nitric oxide, and nitrous oxide over the semiconductor layer.

34. The method of claim 21, wherein the vacancy injecting process further comprises:
implanting nitrogen into the crystalline structure;
flowing oxygen over the crystalline structure after implanting the nitrogen to form an oxynitride layer.

35. The method of claim 21, wherein vacancy injecting process further comprises:
forming a metal layer that is reactive with atoms of the first type on the crystalline structure; and
heating the metal layer to cause the metal layer to react with atoms of the first type in the crystalline structure.

36. The method of claim 35, wherein the metal layer comprises titanium.

37. The method of claim 21, further comprising:
growing an oxide layer on the crystalline structure;
removing at least a portion of the oxide layer.

38. The method of claim 37 wherein the vacancy injecting process is preformed prior to the growing the oxide layer.

39. The method of claim 37 wherein the vacancy injecting process is performed after the removing of at least a portion of the oxide layer.

40. The method of claim 21, wherein the semiconductor layer further comprises carbon.

41. The method of claim 21 wherein the vacancy injecting process comprises:
flowing oxygen and a chloride bearing gas over the semiconductor layer.

42. The method of claim 41 wherein the chloride bearing gas includes at least one of the hydrogen chloride, chlorine, carbon tetrachloride, and trichloroethane.

43. The method of claim 21 wherein the vacancy injecting process includes performing an oxidation process with a chloride bearing gas.

44. A method comprising:
providing a semiconductor on insulator (SOI) substrate with a top semiconductor layer having a crystalline structure comprising atoms of a first type and a second type;
forming material on the crystalline structure using a process that consumes atoms of the first type in a way that injects vacancies into the crystalline structure wherein vacancies recombine with atoms including atoms of the second type; and
forming a second semiconductor layer comprising atoms of the first type on the crystalline structure, the second semiconductor layer being characterized as strained.

45. The method of claim 44, further comprising:
removing the material prior to the forming the second semiconductor layer.

46. The method of claim 44, further comprising:
growing an oxide on the crystalline structure;
removing at least a portion of the oxide prior to the forming the second semiconductor layer.

47. The method of claim 44 wherein the growing the oxide and the removing at least a portion of the oxide are performed prior to the forming material on the crystalline structure.

48. The method of claim 44 wherein the growing the oxide and the removing at least a portion of the oxide are performed after to the forming the material on the crystalline structure.

49. The method of claim 44, wherein forming the material comprises growing a nitride layer on the crystalline structure.

50. The method of claim 44, wherein forming the material comprises:
forming a metal layer on the crystalline structure; and
reacting the metal layer with the crystalline structure to form the material.

51. The method of claim 44, wherein forming the material comprises growing an oxynitride layer on the crystalline structure.

52. The method of claim 44, wherein forming the material comprises:
implanting nitrogen into the crystalline structure; and
growing an oxynitride layer on the crystalline structure.

53. The method of claim 44, wherein the first type is silicon and the second type is germanium.

54. The method of claim 44, wherein forming the material comprises growing an oxide layer on the crystalline structure.

55. The method of claim 54 wherein the forming the material includes growing the oxide layer with an oxidation process including a chloride bearing gas.

56. A method, comprising:

providing a silicon germanium layer having a crystalline structure over an insulating layer;

growing an oxide layer on the crystalline structure;

removing at least a portion of the oxide layer;

forming a first layer on the crystalline structure;

removing the first layer; and

forming a silicon layer on the crystalline structure after the removing at least a portion of the oxide layer and the removing the first layer.

57. The method of claim 56, wherein forming the silicon layer comprises epitaxially growing the silicon layer.

58. The method of claim 56, wherein forming the first layer comprises growing a nitride layer on the crystalline structure.

59. The method of claim 56, wherein forming the first layer comprises growing an oxynitride layer on the crystalline structure.

60. The method of claim 56, wherein forming the first layer comprises:

depositing a metal layer; and

reacting the metal layer with the crystalline structure.

61. The method of claim 56, wherein forming the first layer and the oxide layer further comprises:

implanting nitrogen into the crystalline structure; and

growing oxynitride on the crystalline structure.

62. A method, comprising:

providing a silicon germanium layer having a crystalline structure over an insulating layer;

growing an oxide layer on the crystalline structure with an oxidation process that includes a chloride bearing gas;

removing the oxide layer;

forming a silicon layer on the crystalline structure after the removing the oxide layer.

63. A method, comprising:

providing a silicon germanium layer having a crystalline structure over an insulating layer;

growing an oxide layer on the crystalline structure;

removing the oxide layer;

performing an inert gas post bake after the growing the oxide layer;

forming a silicon layer on the crystalline structure after the removing the oxide layer.